



# Science, Technology, & More!



## Second MP Project

## Black Box Logic Device

Much of our modern technology is a "black box." This expression refers to the fact that most of the operations happen out of sight of the user. We push the buttons on the remote, and the TV channel changes. How does pushing a button change a channel? The average user doesn't know. When the "Check Engine" light goes on, how does the car "know" that something is wrong? In each case, a set of sensors send a signal to a microprocessor, which is programmed to react to different combinations of inputs. Someone has the job of thinking through all of the possible combinations of possibilities. This logical analysis results in a computer program, which then gets translated into an electrical circuit that actually does the job.

A flight data recorder is often called a black box, though it is usually orange to make it visible in a plane's wreckage. Its inputs include information about the flight controls, the engines, and the altitude, and the output is a data file that can be studied after the flight.



Your assignment is to build a Black Box Device that uses battery power to produce an output (sounding an alarm, lighting a bulb, moving a motor, or some other electrical output approved by Mr. Cox). The device must have four input switches clearly labeled with binary questions. The device must be in a closed container, with only the switches visible. When demonstrated to the class, the device will yield an "on" or "off" output depending on the answers of the tester. These outputs should be logically connected to a scenario of your choosing. You may work alone or with one other person taking Mr. Cox's Science & Technology class. Your Device must incorporate four input switches, one electrical output, and a logical connection among them. It must be no larger than 25cm x 25cm x 25cm.

You must show a logic diagram for the Device on Wednesday, December 17.

You must show a wiring diagram for the Device on Wednesday, January 7.

You must demonstrate the Device in class on Wednesday, January 14.

Your grade will be determined based on the rubric found on the back of this page. Here's a quick summary:

- ◆ Did you submit a logic diagram, a wiring diagram, and a project on time? (Your project must be delivered on time, even if you are absent from school, because we'll all be counting on you!)
- ◆ Does the Device use four logical binary input questions?
- ◆ Does the Device yield one logical binary electrical output?
- ◆ Is the Device, and the scenario behind it, unique and personal? (You should be able to construct the device with "junk-drawer" parts.)